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JOURNAL

VOLUME 7 NUMBER 7 • SEPTEMBER, 1951

With launching of the "Arion," 42-foot sailing ketch, Anchorage Plastics Corp., Warren, R. I., has the distinction of having produced the biggest Fiberglas-reinforced plastic boat to date. The new ketch was built to plans of Sidney Herreshoff for Commodore Verner Reed, of the Ida Lewis Yacht Club, Newport, a member of the Anchorage firm. Its Fiberglas-plastic hull and topside deck surface are impervious to effects of fresh or salt water, sunlight, worms, termites, barnacles and rot.

PUBLISHED BY THE SOCIETY OF PLASTICS ENGINEERS, INC.

What's New?

MATERIALS

PLASTICIZER

Hooker Electrochemical Co., Niagara Falls, N.Y., have a new low cost plasticizer for vinyl compounds for use in such formulations as sheeting, wire covering, shoe soles and other compositions which must withstand severe stretching and flexing. Known as MPS-500, it may be used alone or in conjunction with other plasticizers. Hooker Bulletin No. 35 describes physical properties, plasticizing properties, suggested formulations, stabilization and test methods.

CASTING RESIN

Casting resin can now be hardened without heat at room temperature in a matter of minutes according to Rezolin, Inc., 4825 W. Jefferson Blvd., Los Angeles 16, Calif. The newly developed product, Quick-Set, is a liquid accelerator which gives much higher physical properties to casting resins than it has been possible to attain in previous types of quick-set accelerators. They have prepared a sample kit to sell for $6.00.

FOAM

"Corfoam", a liquid phenolic resin which, when mixed cold, will foam to a hard consisteney without applied heat, has been developed by Rezolin, Inc., 4825 W. Jefferson Blvd., Los Angeles, Calif. A $5.00 sample kit will be sent upon request.

COLD

Naugatuck Chemical Division, United States Rubber Co., has developed a new non-toxic chemical to kill mites and tiny bugs. They also announced the development of "cold" synthetic rubber latex, the first to approach natural rubber latex in service and wearing quality.

FOAMING AGENT

New foaming agent for plastics, designated Poropher N (Azo isobutyric dinitrile), is now being manufactured on a production basis for prompt shipment by Westville Laboratories, Monroe Center, Conn. Request for samples and prices addressed to Barrett Fisher receive immediate attention.

COST DOWN

Krieger Color & Chemical Co., Inc., 6531 Santa Monica Blvd., Los Angeles, Calif., announced that increased production and lower production costs have resulted in the substantial lowering of Poly-Supra colorant prices.

MACHINERY

MIXER

L. O. Koven & Brother, Inc., 154 Ogden Ave., Jersey City, N.J., has built a gas-fired mixer for processing under controlled heating condition. The inner mixing tank, 36" diameter by 36" high with a dished bottom, is made of 14 gauge stainless steel for atmospheric working pressure. A full jacket, for 5 p.s.i. gauge working pressure, surrounds the inner tank. The outer jacket wall extends down and is flanged to form a stable base.

Four ring-type gas burners are symmetrically positioned under the mixing tank. They are rated at 300 c.f.m. and burn manufactured gas.

The agitator mechanism consists of six 1½" wide, stainless steel, vertical blades equally spaced on a horizontal stainless steel tee bar. The agitator tee bar is driven by a 2 h.p. gear motor, through a speed reducer, at 47 r.p.m. Discharge is made through the bottom of the tank and is controlled by means of a horizontal long stem valve whose handle extends beyond the outer shell.

CLEANING

Tumb-L-Magic, said to be a greatly improved wet-process tumbling compound, is a new addition to the line of tumbling equipment, compounds and techniques that comprise Tumb-L-Matic Processes for metal and plastics finishing. The special properties of this new formulation are attributed by the manufacturer to the greater abrasive action of the media because of the chemical cleaning action of Tumb-L-Magic. The cleaner acts to suspend grease and cuttings in the solution, thus keeping work surfaces and abrasive media free of action-retarding accumulations. Use of Tumb-L-Magic in conventional tumbling equipment is said to result in a faster, higher finish than was formerly obtainable. Tumb-L-Matic, Inc., 4510 Bullard Ave., New York 70, N.Y.

12-TON LAB PRESS

The Hydraulic Division, Wabash Metal Products Co., 1569 Morris St., Wabash, Ind., announces the new 12-ton (Model No. 12-10) Wabash Hydraulic Laboratory Press in which the flexibility of operation has been maintained. Specifications: Force—12 tons; platen size—7" x 10"; temperature range—0 to 600 F; length of stroke—6"; floor area—10½" x 15"; weight 275 lb.

200-OZ.

Successful operational tests of the huge 200 oz Jackson & Church Press using the Hendry pre-plasticizing process were completed at the Decataur, Ill., plant of General Electric.

EQUIPMENT & SUPPLIES

LIMIT SWITCH

General Control Co., Boston 34, Mass., has developed the du-op switch for use in applications requiring a compact, light weight, long-life, limit switch. As a direct-acting switch, it has no characteristics of bounce. Mechanical lost motion is eliminated by instantaneous contact at the same fixed point of repetitive plunger travel.

CUTTER

A half-speed, straight knife cutting machine which eliminates the costly problem of dusting when cutting layers of synthetic fabrics, plastic film, coated fabrics, has been developed by H. Maimin Co., Inc., 571 Eighth Avenue, New York, N.Y.

DEMINERAL

The Penfield Manufacturing Co., 19 High School Ave., Meriden, Conn., have announced the availability of a new Mono-Bed Demineralizing Unit. Cation and exceptionally strong base anoin exchangers are intimately mixed in a single unit tank, thus providing in one container the equivalent of a large number of "multiple bed systems". The raw water passes through this Mono-Bed column only once, yet comes out with a mineral content of virtually zero.

BOMB-LUBE

Bomb-Lube, an entirely new technique in mold lubrication, has been developed by Price-Driscoll Corp., 366 Madison Ave., New York, N.Y. When the valve on the self-dispensing container is depressed, a fine penetrating mist of particles in the 50 micron range is released. The mist reaches the deepest cavities and deposits a thin film of exceptional lubricity.

ROUTER

Cyclo-Router Carbide Tipped Bit is designed for wood, plastic and similar materials. It is made in ¼", ⅜" and ½" diameters for portable electric routers with standard ¼" shank.

These same sizes and larger diameters will be made with standard ½" shanks for production router machines.

Tests have demonstrated that Cyclo-Router Carbide Tipped Bits will outlast ordinary steel router bits by 100 to 1. They are especially effective when used to cut glued laminated sections of wood or glued laminated sections of wood and plastic.

Made by the New England Carbide Tool Co., Inc., Cambridge 39, Mass. Write for complete information.

HOT STUFF

Thermel, Inc. announces the successful solution to the specifications of a client, to wit, "Thermaheaters" that would enable a plastic sheeting die, 70" in length, to process in excess of three hundred pounds of material per hour at 800°F. The assemblage consists of six cast-in aluminum-bronze "Thermaheaters" on the die proper and three cast-in aluminum-bronze "Thermaheaters" on the throat assembly between the extruder and die. Thermel, Inc., 3440 W. Lake St., Chicago 24, Ill., will gladly submit detailed information on request.

THREADS

Four new small-size stainless steel helical-wire thread inserts, for strengthening tapped threads in aluminum, magnesium, plastic, iron, steel, brass, bronze and wooden components, are available from the Heli-Coil Corp., 47-23 Thirty-fifth St., Long Island City, N.Y. The new sizes include 8-36 and 6-40 sizes in the fine thread series, 5-40 and 4-40 sizes in the coarse thread series and are available in 1, 1½, and 2-diameter lengths.

AIR CLEANER

The Model B. Condensifilter, a device which removes water, oil, sludge and other foreign materials from compressed air, is a new development of Hankison Corporation, 394 Renton Bldg., 1501 Beaver Ave., Pittsburgh, Pa. Combining in a single unit a dehydrating device, a mechanical filter and a self-purging trap, the Condensifilter provides dry, clean compressed air for operating instruments. Measuring only 15" high by 9" in diameter, it has a capacity of 30 c.f.m. at 100 p.s.i.

COUNTER

A long-term exclusive contract has been effected between the Post Machinery Co., a subsidiary of Reid Bros. of Beverly, Mass., and the General Control Co. of Boston for the sale of their Counter, the Post Prismatic Electric Counter. The counter is capable of counting in excess of 10,000 units per second. The high speed is obtained through the use of photo-cell and electronic circuits. It will handle the tiniest as well as the largest parts easily and accurately. The count may be either accumulative or pre-determined.

(Continued on page 19)

POSITIONS OPEN

ENGINEERING OPPORTUNITIES

1. **Estimating Engineer.**
   Familiar with injection and compression molding of industrial and proprietary items.
2. **Tool Engineer.**
   Familiar with design, procurement and estimating on all phases of compression and injection tools and equipment.
3. **Product Design Engineers.**

Salary Open

We are expanding our organization which means plenty of opportunity and a good future. Contact Mr. M. J. Petretti, Engineer, Plastics Division, Continental Can Company, Cambridge, Ohio.

ENGINEER MOLDING

Engineer with some experience in molding thermosetting materials and high speed compression molding techniques. Permanent position in our Phila. plant.

INTERNATIONAL RESISTANCE CO.

401 N. Broad St.
Philadelphia 8, Pa.

JOURNAL

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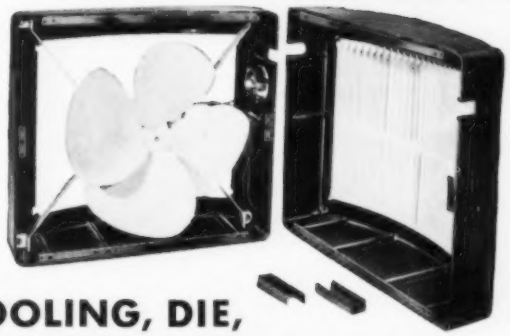
PROFIT HAS MANY FORMS

when the material is DUREZ



TOOLING, DIE, ASSEMBLY COSTS SAVED

Both halves of this 20″x 23″x 14″ cabinet-type ventilating fan housing are produced in one single-cavity mold. The economies noted were achieved in the design of the mold. Tongue and groove assembly sections, cored supporting ribs, grill mounting bosses, metal inserts for fan and motor assembly mounting, and slots for convenient carrying are all molded-in. The Durez long-flow general-purpose phenolic makes a rigid, quiet housing that has unusual sales appeal.

"POPULAR PRICE" leads to VOLUME SALES

This small motorized humidifier taps a great new market in hatcheries, egg storage rooms, hospitals, textile mills, homes, etc., because it costs less to make. Three principal parts are molded of Durez compound specially developed to withstand heat and moisture without loss of electrical and mechanical properties. These can be produced and assembled at a fraction of the cost of the usual metals, need no machining and practically no finishing.

KNOWN AS THE MOST VERSATILE of all plastic materials, the Durez phenolics lend themselves to an extraordinarily wide range of design and production ideas. Durez has specialized from the beginning in the phenolics, now has available a wide variety of phenolic resins and more than three hundred molding compounds, including many designed to meet the requirements of MIL-P-14A. Let our field technicians help you. And to keep informed on industry's use of phenolics, write for our monthly "Durez Plastics News." Durez Plastics & Chemicals, Inc., 1109 Walck Road, North Tonawanda, N.Y.

DUREZ

Phenolic Plastics that fit the job

In times like these...

IT'S THE EXTRAS THAT COUNT!

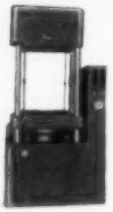
WATSON-STILLMAN 300 oz. Injection Molding Machine

DIE SPACE 48" x 72"
CLAMP 1500 TONS

With materials and labor cost spiraling . . . delivery dates increasingly stepped-up . . . an imminent shortage of skilled operating labor—it is more than ever important for PLASTIC MOLDERS to know all their suppliers . . . and everything each has to offer.

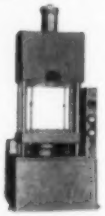
As THE pioneer and fifty-two-year consistent leader in the design and construction of Plastics Molding Machinery, W-S is in an especially good position to offer molders of every size and type a complete service. Not only the finest and most extensive line of molding machinery anywhere available . . . but extra dividends in the form of engineering counsel on materials, die-design, and plant layout.

In times like these, such extra service, extra attention to every vital phase of your operation is increasingly valuable. Because of its machine capacity range of 1-300 ounces, and the broadest range of injection, compression and transfer molding machines, W-S is your logical consultant on any projected expansion. And once you have enjoyed the advantages of COMPLETELINE service —extending far beyond equipment needs alone— you will always consult W-S first on new molding equipment and how to use it.



Compression Molding Presses — 50 to 1200 Tons.

2 Ounce Semi-Automatic Injection Molding Machines.



Transfer Molding Machines—30 to 1200 Tons.

Vertical Injection Molding Machines — 1, 2, 4, and 6 ounces.

Preform Tableting Machines—10 and 100 Tons.

9-L-38

HYDRAULIC MACHINERY DIVISION
WATSON-STILLMAN
Established 1848
Main Office, 153 Aldene Rd., Roselle, New Jersey
Manufactured in Canada by Canadian Vickers, Ltd., Montreal
Foreign Sales Representatives: OMNI PRODUCTS CORP.
460 Fourth Avenue, New York 16, N. Y.

In The News

JOHN A. CROFT has been elected to corporation secretary and member of the Board of Directors of Extruders, Inc., Culver City, Calif.

FRANK B. MOLEN, Midwest technical sales representative for Kralastic molding powder and Vibrin polyester resins of Naugatuch Chemical Div., has moved his headquarters from the Naugatuck, Conn. plant to 247 E. Exchange St., Akron, Ohio. **RICHARD H. MALAMPHY,** Eastern seaboard representative for these same products, has established new headquarters at 254 Fourth Ave., New York, N.Y.

M. G. BENEDICT, 1817 Grant St., Evanston, Ill., has been appointed sales representative in Illinois, Indiana and Wisconsin for Concord Chemical Co.

WILLIAM F. ERATH, authority on dry colors, has joined the technical and sales staff of Whittaker, Clark & Daniels, Inc., 260 West Broadway, New York, N.Y.

JOHN P. GROESBECK, formerly with American Hard Rubber Co., has joined the United States Rubber Co. as a development engineer in their new products division.

DAVID C. S. KLINE, formerly of the Dallas sales office of Rohm & Haas Co., has been made their West Coast field Representative.

GERALD P. YOUNG assumed administrative duties at the Los Angeles office of Rohm & Haas Co. on July 1.

CARL W. BONTEMPS, of Rohm & Haas' Chicago office, has taken over the southwest territory out of the Dallas office.

ERNEST F. DOURLET is with the Rohm & Haas Co. Chicago office.

GEORGE W. DOUGHTY, of the Service Department of Improved Paper Machinery Corp., has been transferred to the Midwest area where his new duties will be those of plastic molding machinery sales and service throughout the Midwest.

WILLIAM F. SCHAFER has been appointed as sales engineer in the Arthur Colton Company's New York office, 303 Fifth Avenue. **LOUIS H. FISCHER** has been appointed sales engineer to represent the company in the Miller Sales Agency, 5807 W. Diversey Ave., Chicago, Ill.

EUGENE M. LANG, former works manager at the Heli-Coil plant, has been elected to the position of vice-president in charge of manufacturing for the Heli-Coil Corp., Long Island City, N. Y.

MAX A. MINNIG, vice president in charge of the Witco Chemical Company's Carbon Black Div., has been elected to the board of directors. **WILLIAM WISHNICK** was appointed Assistant Treasurer.

C. RICHARD NEWPHER was appointed executive vice president in charge of the operating function of Laminated Plastics, Inc., 1823 E. 40th St., Cleveland, Ohio.

ARTHUR L. GE WERTZ, 521 Fifth Ave., New York, N. Y., has been made the Eastern representative for Krieger Color & Chemical Co., Inc..

W. G. (BILL) BACON was made director of the seperate sales department set up by the Gits Molding Corporation to handle the sales of their housewares line.

ROBERT N. NELSON was appointed Sales Manager, Pneumatic Division of Sundstrand Machine Tool Co., Rockford, Ill.

HERBERT E. SMITH, chairman and chief executive officer of the United States Rubber Company retired on August 31 after 38 years with the company. He will continue as a director and a member of the finance committee.

CECIL M. ARROWSMITH, formerly manager of government contracts, has become the director of industrial and public relations for Schick Incorporated. **C. H. PEASE** has become the manager of government contracts.

ALFRED C. YORK, director and vice president of the Watson-Stillman Company, Roselle, N. J., passed away in July after a prolonged illness. Shortly after joining the company in 1918 he became assistant treasurer. After his promotion to assistant to the president, he started and developed the Distributor Products Division of the company. In 1941 he was elected vice president and general sales manager and in 1945 he was elected to the board of directors, at the time he took full charge of the Distributor Products Division.

LEE T. BORDNER is president of the newly formed Sierra Electric and Manufacturing Co., 544 East 31st St., Los Angeles, Calif. He announced the election of **J. C. PRIOR** as vice president in charge of production and engineering and the appointment of F. W. Walters as Sales Manager.

JUDGES FOR 1951 SPE PRIZE PAPER CONTEST ARE NAMED

SPE Prize Paper Contest judges have been named by Henry M. Richardson, DeBell and Richardson, Chairman of the Contest Committee. **Carl J. Frosch** of Bell Telephone Laboratories will serve as chief judge, and serving with him are: **Herbert S. Spencer,** Advertising Manager, Durez Plastics and Chemicals, Inc.; **Dr. Ralph K. Witt,** Johns Hopkins University; **George S. Nalle, Jr.,** President, Nalle Plastics, Inc., and **Sven K. Moxness,** Minneapolis-Honeywell Regulator Co.

Carl J. Frosch

Sven K. Moxness

Carl J. Frosch, Bell Telephone Laboratories, Inc.

Mr. Frosch received his B. S. in chemistry from Union College in 1929 and immediately joined the technical staff of Bell Telephone Laboratories. He studied colloid chemistry at M. I. T. in 1934. He has published several articles and shared in the development of Paracon, a polyester rubber. He is a charter member of the Newark Section of the Society and has been active in national affairs of the Society for some time.

Sven K. Moxness, Minneapolis-Honeywell Regulator Co.

Sven K. Moxness, Chief Process Engineer, Minneapolis-Honeywell Regulator Company. Attended University of Wisconsin, Machine Designer; instructor at University of Minnesota three years, Tool Engineering, Plastic Molding and Die Casting. Tool Engineer and Asst. Chief Tool Designer Minneapolis-Honeywell from 1936 to 1944; since 1944 Chief Process Engineer. Consulting Engineer for various concerns since 1942. Committee member SPE, S.P.I., A.S.M.E.

George S. Nalle, Jr., Nalle Plastics, Inc.

George S. Nalle organized Nalle Plastics after having served four and a half years in the armed services. At the end of World War II Captain Nalle was an Air Corps representative on a technical exploitation team which reported on Germany's plastics and chemical industry, traveling with John DeBell, William Goggin and Walter Gloor. Mr. Nalle received a bachelor's degree in physics from the University of Texas, and did graduate work at Ohio State and Brooklyn Polytechnic in plastics and tool and die design. In addition to being an active SPE member, he is also a member of S.P.I., Texas Manufacturers Association, the Austin Chamber of Commerce, D.K.E. Fraternity, and the Rotary Club.

Herbert S. Spencer, Durez Plastics and Chemicals, Inc.

Herbert S. Spencer became associated with plastics in 1926 as a member of the newly organized General Plastics, Inc., at North Tonawanda, New York, and which is now Durez Plastics & Chemicals, Inc. Mr. Spencer is at present Advertising Manager.

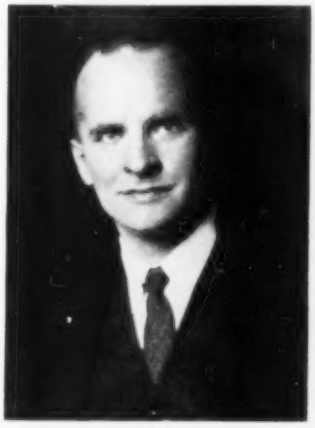
Herb is a charter member of the Society of the Plastics Industry, Inc., and joined the Society of Plastics Engineers shortly after it was organized.

George S. Nalle, Jr.

Herbert S. Spencer

In 1937, Mr. Spencer, Earl Lougee (editor of MODERN PLASTICS at that time), and Victor Sammett of Northern Industrial Chemical Company appointed a committee to develop a long-range business program for the industry, as represented by S.P.I. Around their recommendations, the plans and policies of the Society were formed.

Herb Spencer was principally responsible for the founding of the Plastics Pioneers Association and guided the group from its inception as Chairman from 1941 to 1948, and as President from 1948 to 1950.



Ralph K. Witt

Ralph K. Witt, Johns Hopkins University, Baltimore, Md.

Mr. Witt received his Ph.D. in physical chemistry from Johns Hopkins University after completing undergraduate work at University of Virginia and in Berlin, Germany. He spent two years on research at University of California and then joined the California Ink Company, as director of research. He was with Shell Oil Company for two years before he returned to Johns Hopkins in 1937. A member of SPE and A.S.T.M., he has been associated with various research and development boards of the armed forces and the National Research Council.

SPE Emblem Contest Open To All

JUDGES NAMED TO CHOOSE BEST LAPEL PIN DESIGN

Can you design a lapel pin for SPE members?

A $50 prize awaits the person submitting the best design. Here are the things to keep in mind:

1. The pin should be suitable for fabrication from plastics.
2. The winning design may also be used in the official SPE letterhead and in the SPE Journal.
3. Design or model should be submitted before November 1, 1951, to The Society of Plastics Engineers, Inc., 409 Security Bank Building, Athens, Ohio.
4. Award will be made at the Eighth Annual National Technical Conference, January 16-18, 1952, in Chicago. Decision of the judges is final.

This contest provides a real challenge and opportunity, and both professional and amateur designers are strongly urged to enter. The panel of judges consists of men well known in the fields of plastics and design. The judges are:

Philip A. Belk

Bess Day

Philip A. Belk, Hercules Powder Co.

Philip A. Belk is manager of plastics advertising for Hercules Powder Company and editor of their publication, Cellulosic Plastics. He has been acting in this capacity since 1948, coming to the post from Walter J. Gallagher Advertising, New York City. His background in plastics dates back to 1936, and for seven years he was a member of the Design Section of the Plastics Division of the General Electric Company.

Bess Day, Executive Secretary of SPE since 1948, attended Reed College in Portland, Oregon, and has served in the Bureau of Supplies and Accounts of the Navy Department. In private life she is Mrs. Jesse H. Day.

J. Harry DuBois, Plax Corporation, Hartford, Conn.

After receiving his B. S. degree from the University of Minnesota in 1927, Mr. DuBois was with the plastics department of General Electric Company from 1928 through 1944 at which time he joined Shaw Insulator Company in the capacity of executive engineer. In the Fall of 1950 he joined the Plax Corporation as manager of new product development. The author of several books on plastics, Mr. Dubois was national president of the Society in 1948 and national vice-president in 1947. In 1949 he was elected to Life Membership in SPE. He is a member of the S.P.I., A.S.T.M. and H.K.N., the honorary electrical engineering fraternity.

Louis H. Barnett

Louis H. Barnett, Loma Plastics, Inc., Fort Worth, Texas

After receiving his B.A. in Chemical Engineering and Industrial Management from Northeastern University, Mr. Barnett worked as an engineer with General Electric Plastic Division and York Research and as production manager of Fisher Plastics. In 1947 he established his own injection molding plant, Loma Plastics, where he serves as president and engineer.

He joined the Society in 1946 in the Eastern New England Section. When he moved to Texas, he organized the North Texas Section of the Society.

J. Harry DuBois

J. McLeod Little

J. McLeod Little, J. M. Little and Associates

In 1943 J. M. Little withdrew from partnership in Van Doren Associates to operate his own business under the name of J. M. Little and Associates, at 1217 Madison Avenue, Toledo.

His activities outside operation of industrial design office include membership in the following: Society of Plastics Engineers (Pres., Toledo Chapter, '50-'51); Society of Industrial Designers; Rotary International; Ohio Speakers Club; and Toledo Chamber of Commerce. During 1947-48 he was a Visiting Lecturer in Design at the University of Michigan. Other educational activities in which he has participated include the Product Design Seminar sponsored by the Society of Industrial Designers at Lehigh University in 1950 and the Harvard Design Forum in 1951 sponsored by the S.I.D. and the Harvard Graduate School of Business Administration.

In 1948 J. M. Little and Associates won a first award in the Modern Plastics Competition for meritorious application of plastics on the Toledo Guardian 70 Duplex Scale housing.

Letters to the Editor

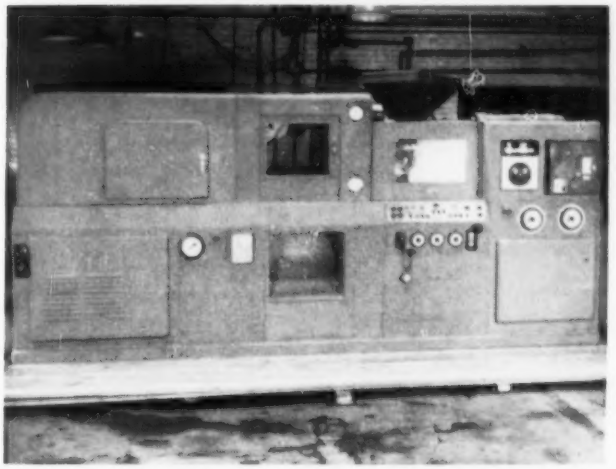
Thermoset Injection

Dear Sir:

I have read, with great interest, the article by A. R. Morse in the May issue of your Journal, Volume VII, No. 5, regarding the Injection Moulderscope. The injection moulding of thermosetting material, as described in the article as used by G. & A. Kovacs of General Machine & Tool Corporation, is not exactly new. I would like to refer you to an article in the April 1949 issue of British Plastics and also in the August 1950 issue of Canadian Plastics written by me.

In the British Plastics I described a method for injection moulding of thermosetting material, that is phenol and urea, in which no spreader is used in the injection cylinder. The nozzle is water cooled and the material is precompressed in a continued process and not in segregated quantities. An additional heating zone is incorporated in the mould proper in the region of the spreue body. A low capacity frequency heater is used during precompression period. I developed this machine in Britain for continuous moulding with thermosetting material. The preheating capacity was not more than ½ Kilowatt for one pound capacity shot. The total injection pressure was not higher than 95,000 pounds and mould clamping pressure not higher than 250 tons, varying with the size of the mould. The quality of the moulding was shown by obtaining sharper corners, higher density and completely cured sections. Great variation of this section did not result in any burning and did not influence greatly the total moulding cycle. It should be mentioned that urea can be moulded very efficiently and no preheating by H.F. is required. The moulds employed were of different types and up to thirty-four impressions for lamp socket mouldings have been used with satisfactory results.

THERMOSET INJECTION MACHINE



In my article in the Canadian Plastics of August 1950, I have described the conversion of standard platen processes for injection moulding by adding supplementary equipment. Standard injection moulding machines for thermoplastic material have been used for thermosetting material moulding. The replacement of the injection cylinder might not be easy as the thermal efficiency and preheating speed have to be considered to obtain an injection pressure applicable to the machine to be used on and higher speed moulding cycle. It is also worth while to mention that by taking care of the heating capacity of the injection cylinder and carefully applied heating controls, the plugging up of the injection cylinder can be prevented, not only during the moulding operation but also after the machine has been stopped for over an hour or longer, which has been demonstrated by the writer.

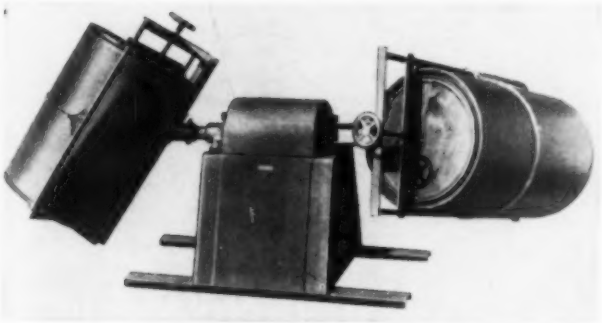
I would be pleased to have your views on this letter and I would like to mention that I am a member of S.P.E. in Canada.

Yours faithfully,
F. C. Goddard.

IMS DRUM TUMBLER

Made Exclusively for

Dry Coloring Injection Materials For The Injection Process



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Inside Stuff

If you would like a sound movie on the Habits of the Norway Rat (US Public Health Service, M 37-b; 28 min), or Refining Oil for Energy (Shell Oil Co.) the 1950 All-Star Football Game (The Chicago Tribune), or if you prefer movies on the manufacture of steel, a concert symphony program, or even 'artistic' varieties, then your meat is the "Blue Book of 16 mm Films," which costs $1.50 or can probably be found in the public library.

Amazing in their variety are the company-made films available free or at a very nominal rental charge. Your exec. sec. is presently engaged in making a list of the films dealing with plastics. This list of titles, complete with how and where to get them, will shortly be mailed to the program chairman of every section.

Word comes that a Major-General (logistics) will speak at the Banquet at the Eighth Annual SPE Technical Conference. Case you'd forgotten, that's in Chicago January 16-17-18 at the Edgewater Beach Hotel.

(Continued on page 19)

THE

Injection MOLDERSCOPE

By A. R. Morse

Injection Molder's Supply Co.

Summer Review:

The summer of 1951 has seen an end of the injection material shortage —and it has also seen some deeply wrinkled brows among injection molders because of cut-backs on radio, TV, auto, refrigerator production — plus well stocked channels into other fields. Many of the jobs injection molders expected to break "if and when material becomes available" have been replaced by other (new) jobs, resulting in an even slower recovery from our slow spring because of unavoidable tooling delays.

Controls, plus half-hearted compliance with CMP is extending repair part delivery among injection machine manufacturers. Our own delivery on replacement heating cylinders has suddenly jumped into October—a sure sign that the original equipment manufacturers' delivery is considerably worse.

This summer has seen several new installations of cooling systems to recirculate chilled water in closed circuits in injection plants. Economies expected have been far exceeded by actual results. Cooler oil and cooler molds mean faster cycles, less down time. Records prove 5-10% overall increase in production in at least 2 cases where detailed studies were made. Result? Water saved and production increased pays for recirculating and refrigerating installation in 18 months or sooner!

Preplasticizing:

This topic still haunts the injection trade. A new injection machine using preplasticizing along the lines of the Jackson and Church has been made by National Welding Machines Co. and is installed at Electric Auto-lite. We have scheduled a visit to this plant and will report later how this newest addition to the injection machinery ranks stacks up. To date, Watson (and Reed-Prentice with a design strikingly similar to Watson's) along with HPM seem to have the potential edge in preplasticizing for one very simple reason: the full clamp, plus full rugged construction is used. You just can't cut down on clamp and platen thickness and get full benefit of preplasticizing. The topic is a real touchy one. We just don't know WHY preplasticizing does NOT reduce need for full clamp and full machine rigidity, but injection molders say it doesn't, and prove it by doing their best work on machines with standard, full heavy duty clamp ends. We all hoped for an over-all machine economy in machine construction from preplasticizing, but so far it seems this machine type is going to cost a good deal more than standard machines instead of less.

There is only one possible conclusion about preplasticizing to date: a properly designed heating cylinder (up to 60 oz.) will do everything, and sometimes more than a preplasticizing unit will, and possibly at a faster clip with less scrap and at much less cost for equipment. Over 60-oz.—that is something else. Injection molders are still talking a better game of preplasticizing than investing in it—and probably wisely too, if they absolutely MUST have full production time from the dollars and floor space involved in any one piece of equipment.

Standard Nozzle Design:

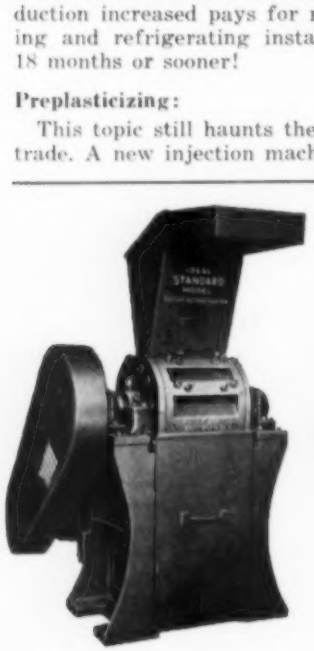
We acknowledge our gratitude to the boys at Nash-Kelvinator for a good idea in nozzle design that has led to the first step in nozzle standardization. They suggested a 40 degree internal taper in place of the various long tapers used by the several equipment makers, and in place of the Dow full internal radius. We tried it, proved it stronger, easier purging, better flowing than all the old style tapers. After a year's trial we have put this standard taper into all our replacement nozzles for all makes and models of machines. Result? A uniformity of flow and performance between various machines which has surprised and pleased everyone.

Now an injection molder can get a nozzle for one make of machine that is designed internally exactly like all others, and which will perform like any other—which will mottle, purge and flow exactly alike (as far as nozzle design affects these variables). The new nozzles carry a substantial column of hot material right up to the orifice or nozzle tip, preventing chilling and freezing, and imparting considerable frictional heat as the material is suddenly speeded up at the orifice.

Next month—"Injection Molding of Nylon."

Proprietary Plastic Manufacturer's Assn. Is Formed

The first general meeting of the recently formed Proprietary Plastic Manufacturers Association was held Wednesday July 11 at the Hotel Chelsea, Atlantic City, N.J. Aim of the new organization is the advancement and upgrading of the merchandising activity of the plastics industry as a whole. Their temporary office is Lincoln Towers, 75 E. Wacker Dr., Chicago, Ill.



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The Extrusion of *Polystyrene*

by W. C. GOGGIN *and* J. N. McDONALD, JR.
The Dow Chemical Co., Midland, Michigan

Good polystyrene extrusion practice follows the basic principles of thermoplastic extrusion with only minor exceptions. These exceptions and specific details involved can mean the difference between success and failure. The following discussion covers the specific details of material, equipment, and operations which experience has proved successful with polystyrene.

1. The Extruder for Polystyrene and Its Operation

The key to successful extrusion of polystyrene is sufficient intermixing of the melting plastic to insure uniform heating to the proper temperature as the plastic leaves the extruder orifice. The extruder must provide uniform viscosity and the steady pressure required to move the plastic. Close attention to design details and top-quality workmanship are the bases of the good polystyrene extruder. It is a far cry from a rubber tuber and cannot operate efficiently with inaccurately machined components and large clearances between screw and cylinder. Polystyrene's excellent thermal stability makes possible a relatively long inventory time in the machine to achieve uniform heating. The extruder should be of sufficient length to accommodate at least three independent heating zones and to provide sufficient inventory time to heat the plastic to uniform temperature at commercial output rates. Figure 1 shows a sectional view of a suitable polystyrene extruder.

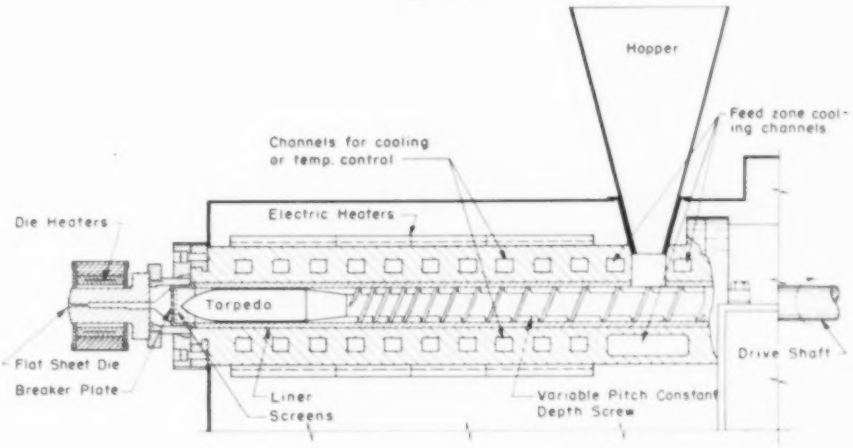
a. Cylinder and Liner

The screw of the extruder is surrounded by the liner which has been fitted to the base cylinder and accurately aligned with the drive. The cylinder is either of cast or fabricated sections and includes a hopper section. Channeling is provided in the cylinder to carry the heating and cooling mediums whether steam or oil. The channel is useful in the temperature control and cooling of an electrically heated machine. The cylinder must accurately receive the liner to give maximum heat transfer. Its bore is slightly tapered for a good press fit.

The feed hopper is located in the first section of the cylinder. Its function is to maintain a constant inventory of plastic to be fed into the screw and to provide a uniform rate of flow. It is usually channeled or jacketed to allow operation at maximum temperature but still prevent the plastic from softening and sticking to the walls. Liners are made of a hard alloy steel, selected for optimum wear, corrosion resistance, and machinability. Xaloy 306, a centrifugally cast high nickel alloy of extreme hardness and low elongation has been quite acceptable (Industrial Research Laboratories, Ltd., 215 Market Street, San Francisco). The liner bore is perfectly cylindrical and polished to a mirror-finish to provide streamlining and ease of cleaning. Chrome plating is not usually desirable.

The breaker plate and screen are located at the end of the liner as shown in Figure 1. The plate consists of a steel disk containing closely spaced $\frac{1}{8}$ to 3/16 in. diameter holes. Screens ranging from 20 to 100-mesh may be inserted on the upstream side of the breaker plate with the finest screen closest to the end of the screw. Occasionally breaker plates are omitted when there is no question of contamination or need for additional back pressure for the screw. When breaker plates and screens are used, it is important that they be inspected periodically to prevent clogging which

Figure I



AN EXTRUDER FOR POLYSTYRENE

This article forms the basis of a section of a chapter on Fabrication of Polystyrene to appear in an ACS Monograph "Styrene" to be published soon by Reinhold Publishing Corporation.

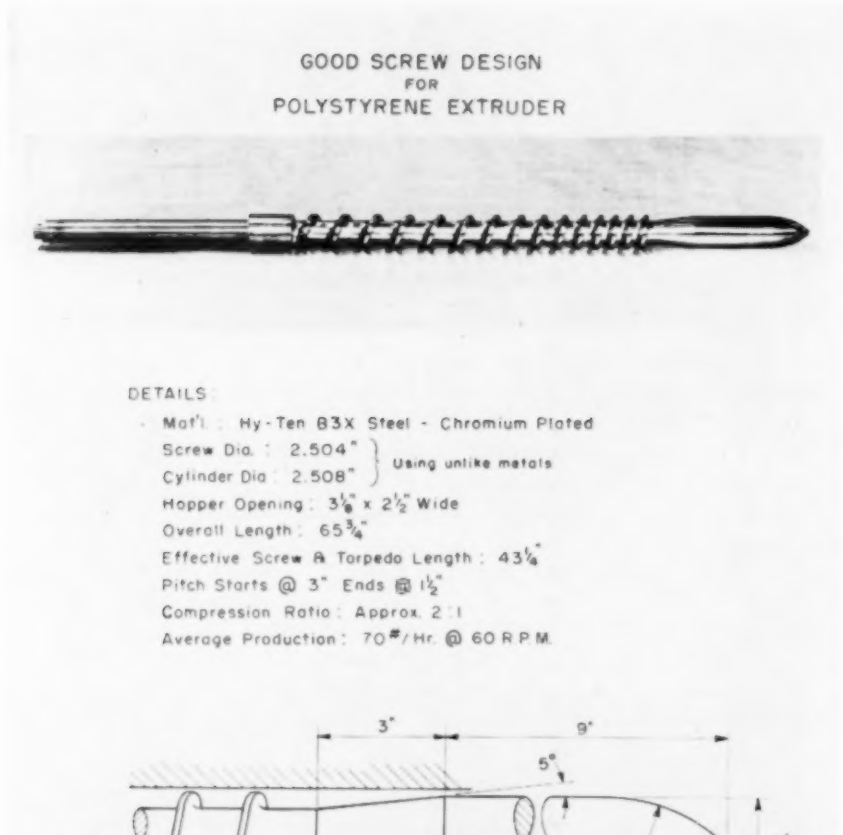


Figure 2

would cause excessive pressure build up.

b. Heating Considerations

The quality of the extruded product is directly related to proper heating and temperature control. In the polystyrene extruder, the hopper zone should be kept below the melting point of the plastic, while in the following zones the temperature is gradually increased and plastic compressed as the screw feeds it to the torpedo. At the downstream end of the screw and around the torpedo, considerable smearing action takes place. In a good design this provides for plastic intermixing and uniform viscosity. Best results are usually found with progressively increasing temperatures as the plastic moves toward the die. Should these conditions become reversed, the plastic can become stationary in the flights of the screw, sliding on the cylinder, and refuse to move forward.

In order to insure temperature gradient along the screw somewhat comparable to that along the cylinder wall, screws are often cored for circulating water or steam. This coring usually extends only a few flights past the hopper zone. It is particularly desirable in screws larger than 2½ in. in diameter.

Irregularities in the extruded polystyrene often indicate the nature of the difficulty. Non-uniform heating usually appears in the form of small lumps or gels in the finished part. This condition often occurs with full-flighted screws (that is without torpedo) or with an extruder having a large torpedo cylinder clearance (⅛ in. on a side). Some methods of heating give rise to local hot spots on the cylinder wall. This defect can usually be detected by streak marks or lines in the extruded product. Electrically heated machines can be bad offenders in this regard.

The three heating and temperature control mediums in use with commercial extruders are steam, oil, and electricity. Polystyrene extrusion temperatures range around 400° to 500°F. In steam heating this would require pressures of over 500 psi. While steam is ideally suited for precision control, as well as rapid heating and cooling, very few extrusion plants have high pressure steam systems, so other methods of heating are usually required. In addition the use of high pressure fittings and the precautions necessary for handling steam somewhat limit its flexibility.

Many extruders are oil-heated. Oils have been developed which are stable at temperatures up to 500°F. even over long periods. Uniform temperature across the heat transfer surfaces is readily obtained with oil, but temperature changes are slow when compared to steam. In operation, the oil is usually electrically heated and continuously pumped through the extruder entering at the underside and leaving at the top. Zone temperatures are obtained by regulating the volume of oil flow through the respective channels. Appreciable changes in one zone may require compensating changes in others. Arrangements made for rapid cooling of oil-heated extruders include a reservoir of cold oil which can be pumped through the extruder or by directing part of the oil flow through a water-cooled heat exchanger.

Work Heat

The mechanical work done on the plastic by the screw can result in considerable frictional heat. The heating medium must be able to absorb and carry away excessive heat. Oil and steam work well in this regard, but the electrical heating system will not absorb excessive heat. Consequently, with electrical heat, it is also necessary that a cooling and temperature control medium be used. In modern designs the cylinder is channeled for passage of air, low pressure steam, or oil.

Electrical heating is popular because of its economy and cleanliness. Figure 1 shows the method of electrically heating an extruder using band heaters and channels for the passage of the cooling medium. Temperature is maintained by instrument controls acting from thermocouples embedded close to the liner. This system is not without its drawbacks since the thermocouple is located some distance from the heat source and excessive temperature lag may result. With polystyrene, plastic temperature must be maintained within 10°F. for close section size control. Where the extruded section involved has wide size tolerances, this narrow range of temperature control may be broadened. The plastic temperature control problem is under study and anticipatory and proportioning controls are now being used experimentally. New electric heaters based on resistance units cast in aluminum or ceramic and designed to fit the cylinder tightly, appear to reduce tendencies toward local hot spots. Tests indicate that temperature fluctuations on an electric extruder with the right equipment can be kept within 5°F. This, of course, permits good section size control and finish.

Each method of heating leaves

something to be desired, but it is true that all the methods mentioned above are being used successfully even in close tolerance extrusion. Refinements in temperature control techniques in each system have made such extrusion practical.

c. The Screw

The keystone of the extruder design is the screw. It must densify the plastic from its granular state, provide uniform plasticization by mixing while heating both by conduction and friction, as well as develop uniform pressure to overcome resistance to flow offered by the die, screens, and breaker plates. The factors to be considered in screw design may be listed as follows:

1. Clearances between screw and cylinder.
2. Overall length.
3. Use and design of torpedo.
4. Compression ratio.
5. Flight pitch, depth, and configuration.
6. Provisions for temperature control.
7. Materials of construction.

Clearance

1. A minimum running clearance is desirable between screw lands and cylinder liner. Figure 2 with a suggested design of a screw for extrusion of polystyrene indicates clearances of 0.002 in. on a side of a 2½ in. screw. A close fitting screw gives a more uniform rate of delivery, provides better flow, operates at higher efficiency, and provides some self-cleaning action. Since the plastic sticks to the cylinder and slips on the screw, it is obvious that a close fit is desirable.

Length

2. The longer the screw, in general, the more thorough the mixing and more uniform the heating. With polystyrene a minimum effective length of a 2½ in. screw including the torpedo should be at least 42 in. A desirable length is 48 to 54 in. Of course, the larger the diameter of the screw, the greater the length.

Torpedo

3. The use of a torpedo has long been a point of controversy. Its purpose is two-fold; first, to provide a thin section of plastic for final uniform heating and, second, to iron out the cyclic fluctuations inherent in any screw delivery. Small clearances are desirable. They are of the order of 1/16 in. on a side for a 2½ in. machine and ⅛ in. for 3½ in. and 4½ in. screws. A screw and torpedo arrangement will have less output than a full-flighted screw of comparable length but with polystyrene the increase in quality and the reduction of scrap usually more than off-sets the lowered production. With a screw and torpedo arrangement of the design shown in Figure 2, commercial production rates of 70 lbs. an hour at 60 r.p.m. are obtained with an output variation of less than 2%. This is considered good for polystyrene in a 2½ in. unit.

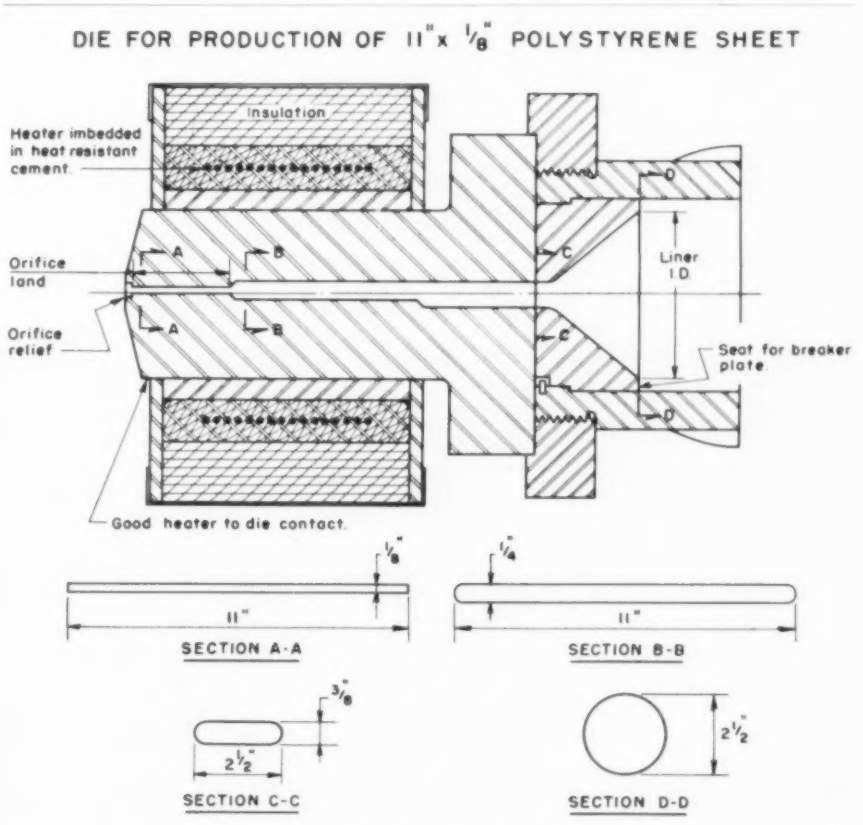
Compression Ratio

4. The compression ratio of the screw is the volumetric ratio of the flights in the hopper zone compared to the last flights just prior to the torpedo. This ratio should be somewhat higher than the ratio of density of solid plastic to apparent density of granules, in order to provide positive pressure to the die assembly. Polystyrene granules with an apparent density of 0.55 must be compressed 1.9 times to reach the finished plastic density of 1.05. Thus a screw with a compression ratio of at least 2, as per the design of Figure 2, gives good results with polystyrene. This compression may be obtained either by decreasing the screw pitch or increasing the root diameter or by a combination of both. The decreasing-pitch screw has less tendency to pulsate and the pressure transmission is somewhat better. The increasing root diameter screw allows better heating through thin plastic sections, but the plastic has a shorter path of travel than in a variable pitch type. It is somewhat easier to machine. Both types give good production rates and are satisfactory with polystyrene when used with a torpedo.

Flight Pitch

5. Experience has shown that screws having more than a single flight are, in general, unsatisfactory for use with polystyrene. With a double-flight screw, it is possible for the flow of material to halt in one channel and continue in the other, giving large variations in product output. The same objection appears valid on a specially designed screw which consists of a single flight carried into a double flight part way down the screw.

The flights of the screw originate at the hopper zone and carry through to the point where the screw attaches to the torpedo. The flight pitch at the hopper zone is in the order of the length of the hopper opening which in turn is about equivalent to the cylinder diameter. In Figure 2 the flight pitch for the 2½ in. extruder starts at 3 in. and decreases to 1½ in. while maintaining a constant flight depth. The first three flights are of equal width because the plastic remains essentially in a granular state. From the fourth flight through the tenth flight the pitch decreases to 1½ in. because the material in this zone is being compressed from loose granules to solid molten plastic. The remaining four flights have a 1½ in. pitch to provide uniform delivery to the torpedo. A screw of varying flight depth rather than pitch would



APPROXIMATE SECTIONS OF CHANNEL FOR PLASTIC

Figure 3

show approximately the same changes in cross sectional area along the screw, all accomplished by reduction in depth.

Much experience supports the design of screw flights of Figure 2. It is important to shape the flights so that the plastic is forwarded axially rather than forced radially away from the screw toward the cylinder wall. To accomplish this, the leading edge of the flight is maintained sharp with a small radius (⅛ in. for a 2½ in. dia. screw) to provide a positive drive shoulder. The trailing edge is considered to be a dead spot in the screw and in order to eliminate stagnation and local burning, the radius is much more liberal, being about ¾ in. for a 2½ in. dia. screw. The same design considerations would hold in an increasing root diameter, constant-pitch screw flight.

Temperature

6. The importance of temperature control of the screw is dependent on the size of the screw. It is of minor importance in the smaller sizes. With increased screw diameters, coring a few flights beyond the hopper is desirable. Cooling in this coring will prevent the plastic from sticking to the screw and interfering with the feed.

Materials

7. The selection of a material for an extruder screw should be based on corrosion and wear resistance, as well as a reasonable degree of machinability. As indicated in Figure 2, a satisfactory steel is Hy-Ten "B" No. 3-X (Wheelock, Lovejoy and Company, Inc., 125 Sidney Street, Cambridge 39, Massachusetts) or a steel with properties similar to SAE 2345, particularly one whose Rockwell C hardness is 35 to 38 and whose Brinell is 325 to 350. Highly polished finishes appear to offer less opportunity for plastic adhesion to the metal, thus giving higher screw efficiency. A good finish also simplifies cleaning. For polystyrene, a well finished chrome-plated steel screw appears to be advantageous. This is in contrast to the cylinder liner for which chrome plating is undesirable.

d. The Drive

The drive is responsible for rotating the screw and providing the pressure to feed the plastic material through the extruder and die. Much of the power transmitted to the screw is changed to heat through the frictional and shearing forces developed within the plastic. An extruder is considered to be operating efficiently with polystyrene if it produces around 20 lbs./hr./h.p. A variable speed drive for the extruder permits flexibility and control of inventory time, the amount of mixing, frictional heat development, and output rate. Of course, the output rate can be no more uniform than the speed of the drive so it is important to select a drive that will maintain speed uniformity. Commercial drives with satisfactory ranges of speed ratios of 4:1 to 7:1 are available. DC drives operating from a converter, though expensive, are very satisfactory.

The power input to the screw is a good indication of the performance work being done on the plastic. A wattmeter on the motor, while including motor losses, still gives a good indication of the performance of the equipment. Also, an ammeter in the motor input circuit is useful in indicating the condition of the plastic since the current to the motor is indicative of the power required to drive the screw. Care should be taken to protect these instruments from high starting power requirements.

e. Die Design

Proper die design is responsible to a large degree for the quality of the finished product. Much study has gone into the question of extrusion die design, but it is still largely a matter of common sense coupled with experience and the ingenuity of trial and error. For this reason, it is often desirable to make an experimental die from a soft, easily machined metal such as magnesium so that flow corrections can be easily and inexpensively made and the corrected dimensions later applied to production dies. Unfortunately, extrusion dies are seldom interchangeable from one machine to the other from the standpoint of performance, so corrections on a die should be carried out on the machine on which it is to be used. The orifice configuration does not usually conform to the cross section of the finished part as a drawdown of 15 to 20% is desirable. This drawdown of the molten section offers one of the best methods of section and size control. In general, the die must redistribute the circular rod of molten plastic coming from the screw section to a satisfactory orifice shape. Figure 3 shows the design of a die for the production of a flat sheet 11 in. wide and ⅛ in. thick. The changes in section of the molten plastic which take place while passing through this die are also shown in the figure. It will be obvious that the path of the plastic coming from the center of this thin, rectangular orifice is not as long as that coming from the edge. In other words, without any more correction than is apparent in Figure 3, the extruded section will be heavy in the middle and thin on the edges. Consequently, it is necessary to design in the die a restriction which will increase the resistance of the flow of the plastic in the middle to equal that of the plastic flowing to the outside. Figure 4 shows a typical form of this type of restriction. Its shape and position are largely a question of trial. An experimental forerunner of this die in operation producing polystyrene sheet is shown in Figure 5.

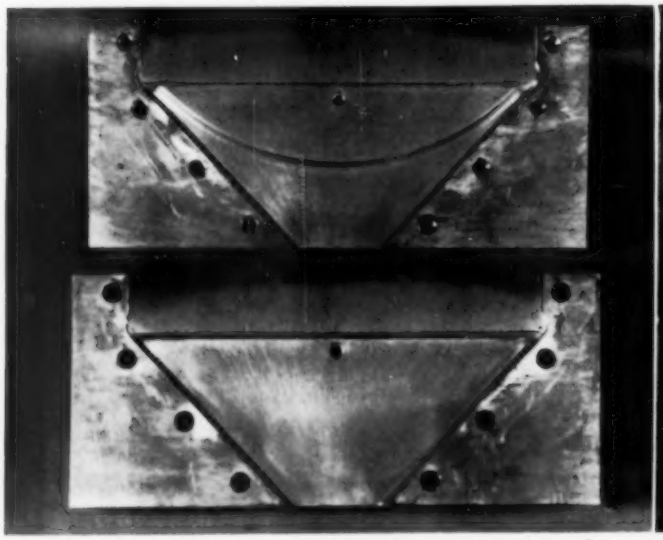


Figure 4. Design of die restriction to produce uniform plastic flow.

Figure 5. Extrusion of 11 inch by ⅛ inch polystyrene sheet showing the necking down between the die and roller conveyor.

Die Surfaces

The final die surfaces must have a high finish and good surface gloss if die lines in the extrusion are to be eliminated. This usually means buffing the hardened steel surfaces. The proper length of die land (that continuous, uniform section at the orifice) assists in achieving uniform flow viscosity as well as giving optimum surface characteristics. With polystyrene, a land length of from 1 to 2 in. is usually quite satisfactory. Theoretically the land should be long enough to impart sufficient back pressure to give good flow characteristics to produce a good gloss, and to eliminate post-extrusion dimensional change. Too long a land will result in excessive internal pressures and low production rates.

A readily machinable metal such as fine grained electrical furnace steel has been found very satisfactory for die construction. Hardening is not usually essential but, if it is anticipated, the steel should have a drawing temperature above 500° F. to prevent warping in use.

The control of die temperature is extremely important. A cold die or cold parts of the die give rough, uneven surfaces, while a die that is too hot results in excessive sticking. As with extruders, dies may be heated in a number of ways. Probably most dies are now electrically heated with the temperature being indicated and in some cases controlled by a thermocouple located near the plastic channel. When used for automatic temperature regulation, this thermocouple should not control the full power to the heater, otherwise excessive die temperature variations result. One widely used method is to use an indicating thermocouple with a manually variable power source such as an auto transformer or potentiometer. Wire-wound resistance heaters around the die are usually found satisfactory if good contact with the die is maintained. Heating wire embedded in heat-resistant cement is quite desirable. In Figure 3 it will be noted that such an arrangement is used along with thick insulation over the heating unit. The importance of sufficient insulation to prevent heat losses and temperature variation throughout the die cannot be over emphasized. Many extrusion difficulties have been solved by the simple expedient of adding more insulation to the die.

2. Take-Off Equipment

The extruder is responsible for delivering molten plastic at a uniform rate and at uniform temperature in a section approximating that ultimately desired. The remainder of the problem is the responsibility of the take-away equipment and of cut-off devices. Here again, high quality is most desirable. This equipment must hold or aid in forming the section while the plastic is cooling. Improper take-off equipment can ruin what would otherwise be a perfect extruded section.

a. Cooling Problems and Conveyors

The first consideration as the section leaves the die is to cool it properly to maintain the desired shape without buckling or warpage. With polystyrene, cooling is usually accomplished in the open air with the assistance of carefully positioned air jets. Uniform cooling is particularly important in variable sections since lack of uniformity will produce distortion and bowing. Small-sized (¼ in. to ⅜ in.), easily bent copper or aluminum tubing is often used to support the hot plastic shape as it leaves the extruder and is carried on to the first part of the cooling conveyor. The tubing may be cooled to prevent the plastic from sticking by circulating water or air. Sometimes it is slotted or perforated to form air jets which support the hot plastic while it cools. The ease with which these tubes can be bent permits an infinite variety of rapid support corrections and cooling changes.

REPRESENTATIVE POLYSTYRENE EXTRUSION METHODS

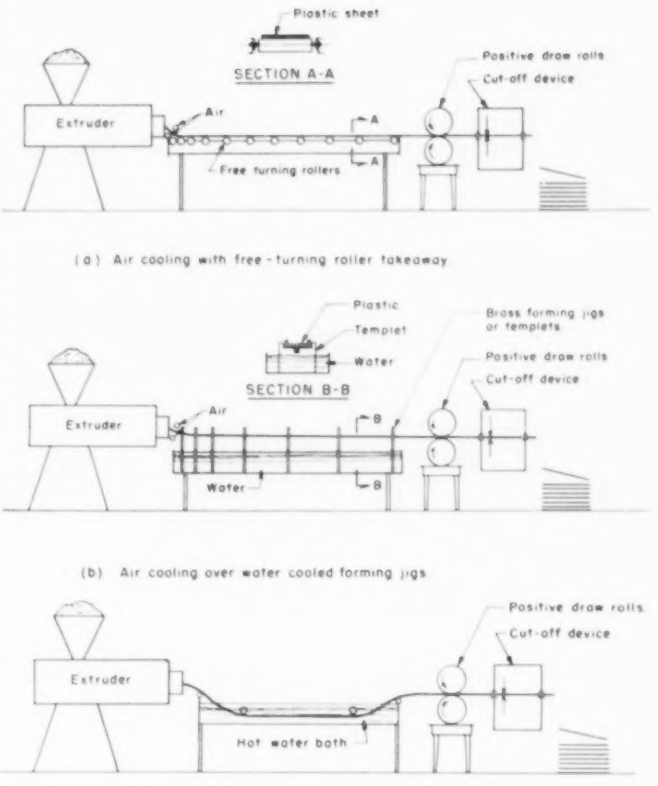


Figure 6. Line diagram layout of extrusion set-ups.

Cooling Styrene

Three methods of cooling polystyrene while drawing the section away from the extruder are shown in the line diagrams of Figure 6. The first method is particularly adaptable to flat sheets and sections that are not too complex in nature. It consists of carrying the molten extruded section over free running metal or wooden rollers while the cooling takes place. The cooling may be accomplished by convection or by air jets directed at certain portions of the section to obtain selective cooling. Figure 7 shows an experimental flat sheet extrusion arrangement consisting of the roller type conveyor equipment and rubber draw rolls. The draw rolls are positively driven and carry the cooled section away from the extruder at a uniform rate. Draw rolls of this nature can be used with all three extrusion arrangements shown in Figure 6. It will be seen that arrangement "a" might well make use of contoured rolls to handle a section more complex than just a flat shape. It would also be possible to change slightly the shape of each subsequent forming roll to permit a gradual change in the shape of the section from the orifice section to the desired section while cooling takes place.

Arrangement "b" of Figure 6 shows a second method of cooling which is often found in practice. In this method the extruded shape is carried over metal templets. These templets are cooled by partial immersion in water. Again draw rolls with a positive drive furnishes the motive power for carrying the sections over the templets. Here also it will be seen that the shape of the templets can vary as the plastic carries down the conveyor in order to progressively form it as it cools. Figure 8 shows two extruded sections coming from a double orifice die and being carried over, cooled, and held in shape by the metal templets.

A third method of controlled cooling is shown in Figure 6, "c". It involves the use of a water bath

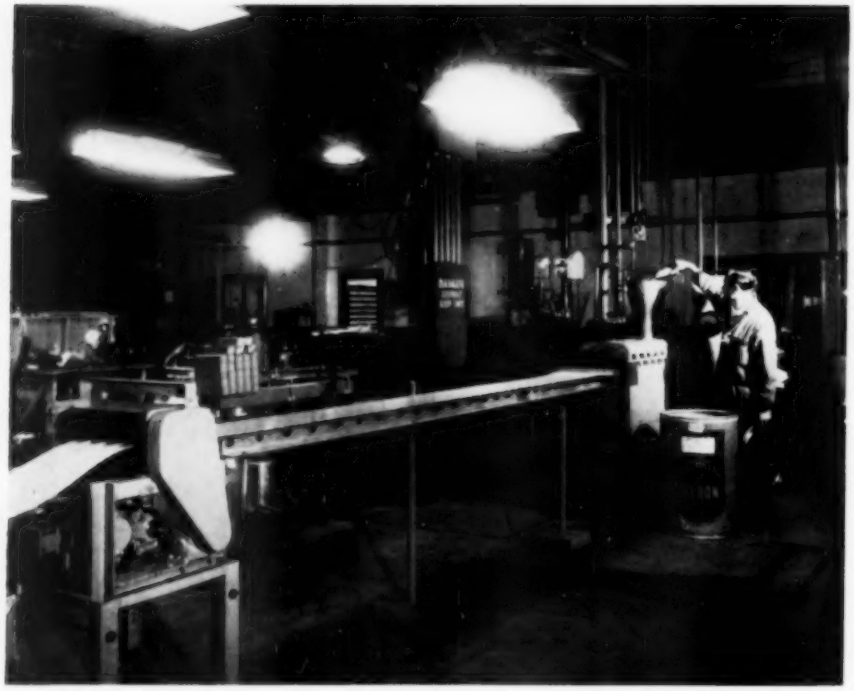


Figure 7. Extrusion layout for production of polystyrene sheet. Note cylindrical roller conveyor and driven rubber roll takeaway equipment.

through which the extruded section is carried. Of course, the temperature of the water bath can be varied to control the plastic cooling rates. In general, however, even with hot water, the cooling rates are more severe than those in air and often too drastic for many sections. In other words, a frozen skin may form which will not permit sufficient shrinkage so that bubble formation in the heavy sections results. Usually the use of a bath also necessitates a section which can stand some bending to enable it to dip in and out of the bath. This method is sometimes used for rods or other uniform sections.

The rate of cooling of the extruded shape is inversely proportional to the material thickness and directly proportional to the time involved during take-away; thus heavy sections or sections extruded at high rates may require long conveyor cooling devices. A usual practice in most extrusion operations is to draw down the molten section in the order of 15 to 20% by carrying it away from the extruder faster than the extruder will produce a section of the orifice size. This permits a good method of size control, but it is obvious that assuming a uniform extrusion rate the take-away rate must be constant if size fluctuations are to be prevented. Good extrusion, cooling, and take-away equipment should be able to produce at commercial rates a flat width section of 6 in. having dimensional tolerances of less than 1/16 in. Positively driven draw rolls, such as shown in Figures 7 and 9, provide an excellent means of carrying away the extruded section at uniform rates. These rolls may be designed and placed to conform to the extruded shape to prevent breakage or cracking. It is obvious that the draw rolls must be spaced far enough away from the extruder to permit sufficient cooling to prevent sticking or deformation of the section. This take-away device is positive and yet has a minimum of contact with the plastic. A wide speed range is necessary if the unit is to be truly versatile. This is often achieved by changing the gear reduction unit or sheaves in addition to using the variable speed control mechanism.

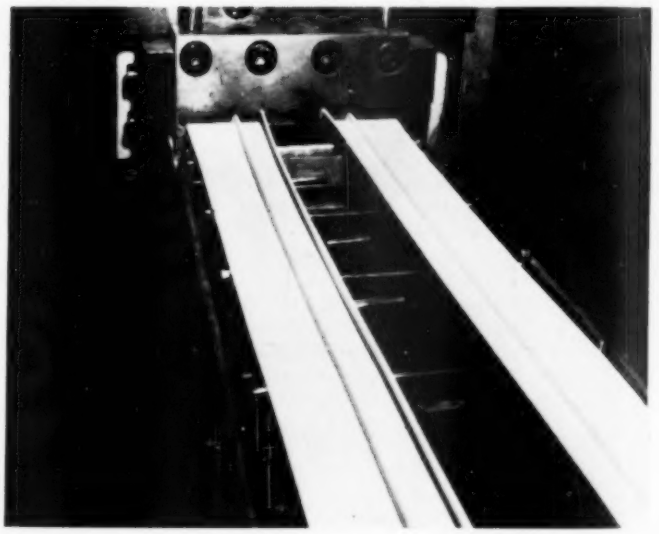


Figure 8. Take-off equipment based on partially submerged metal templates.

b. Cut Off Equipment

Most extruded sections are used in a definite length rather than in continuous lengths. Accordingly it is often desirable to cut off the section as it is being produced to make possible subsequent finishing or immediate packaging. Polystyrene is less adaptable to cut off methods than other plastics with higher impact strength. With polystyrene, impact-type cutting tools like punch presses or guillotine knives can rarely be used if fractures and cracking are to be avoided. If this equipment is used, best results are usually obtained when it is actuated by solenoids or air cylinders. Since the impact strength of polystyrene is higher at higher temperatures, it is sometimes advantageous to cut the section before it is completely cool. Care must be exercised to prevent bending and warping when a warm section is cut. Hot scribing followed by breaking when cold shows some promise. Heated knives or hot wire cutting methods while sometimes applicable, do not usually leave a clean-cut end.

In general, the most satisfactory method of cutting polystyrene is through the use of a single or gang of traveling saws. A typical installation might involve the use of a flying saw attached to a sliding table. Careful timing and speed control should permit the cutting saw to contact the moving extruded section and move with the section at the same rate as it is being extruded, thus leaving a clean-cut end. When the cut is complete, the saw returns to its initial position in preparation for the following cut. Sometimes it is necessary to support the section on either side of the cutter to minimize the shock of cutting.

3. Types of Polystyrene Suitable for Extrusion

Most general-purpose types of polystyrene are suitable for extrusion. The major considerations are as follows:

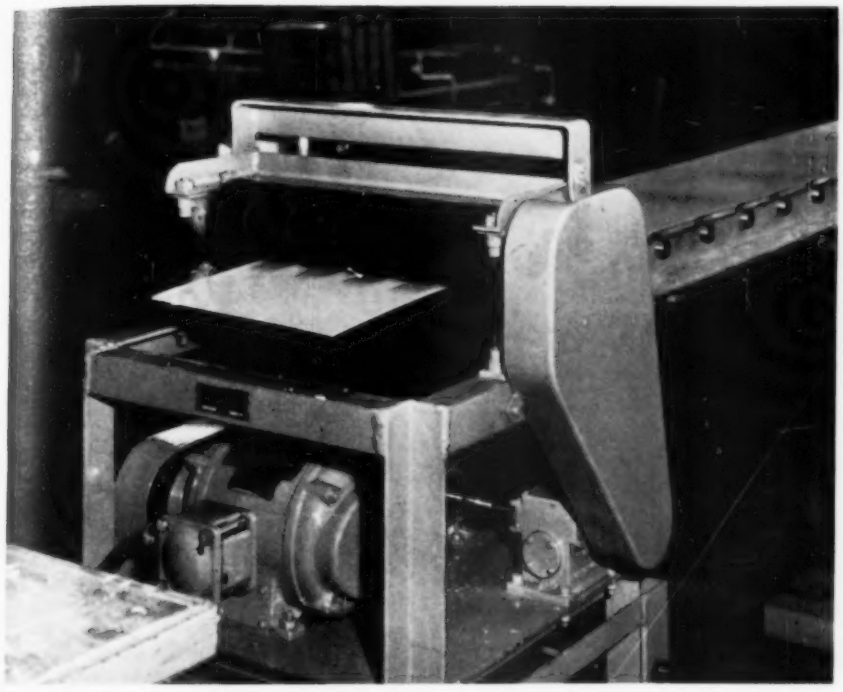


Figure 9. Driven rubber draw rolls. Roll segments can be moved to accommodate special sections.

It is important that the granulation chosen remain uniform and that it be used with the screw having the proper compression ratio. Viscosities ranging from 30 to 70 (cps. in a 10% toluene solution) are satisfactory. The flow properties (as determined by melt viscosity, solution viscosity, or even molecular weight and distribution) once selected should remain uniform for consistent quality. Polystyrenes which contain proper lubricants in the formulation extrude well, while granules with an external surface lubrication often give lowered extrusion rates and possible erratic results because they are so slippery it is difficult for the screw to grip them and start them through the machine.

As in the molding of polystyrene, it is not usually necessary to pre-dry granules unless moisture condensation has taken place. Moisture can be as critical in the extrusion process as in molding. If the plastic granules are heated, they can be fed to the extruder while still warm. As in molding, pre-heating of the granules can also increase extrusion production rates.

Summary

Polystyrene is an excellent plastic for extrusion, providing care is exercised in (1) the selection of the material, (2) the design of extruder components, including the die, (3) the selection of the cooling, take-away, and draw rolls, and (4) use of appropriate cut-off devices. It is through the attention of these various points that commercial extruders in the United States now find it possible to produce many millions of pounds of polystyrene extruded sections per year.

Buffalo and Toronto Meet Jointly

A joint meeting of the Buffalo and Toronto Sections of SPE has been scheduled for September 21st to be held in Buffalo. The topic for discussion will be injection molding cycles and their relation to part quality. Heater design, nozzle design, recent modifications in nozzles to handle specific materials only like acetate or styrene, and the general problem of injection machine speeds will also be covered. A.R. ("Ren") Morse, President of Injection Molders Supply Co. will moderate the discussion, and the other guest panelists will be Nelce Taylor of Tennessee Eastman Corp. and Gordon Thayer of Dow Chemical Co., both technical service experts.

W. New England Has Golf Meet

By Wesley S. Larson

The summer meeting of the Western New England Chapter of the SPE was in the form of a golf meeting held June 8, at the Avon Country Club in Avon, Connecticut. A total of 58 members and guests were present at the dinner with approximately 20 being guests from the Connecticut Section of the SPE. Both the golfing event and the dinner following were very successful. Mr. W. Klinger of Remington Rand was awarded the low gross prize with a score of 82. Ray Mazur won low net with 71 and Al Shuneman took top honors with high gross of 136.

The golfing awards and a large number of door prizes were awarded after the dinner. Mr. Charles D'Emery, President of the Connecticut Section spoke briefly for the guests and Mr. George Carlson of the Western New England Chapter and chairman in charge of the event responded. The Western New England Chapter wishes to thank each of the firms and individuals contributing door prizes for this occasion.

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HISTORY AND FUTURE OF LARGE INJECTION MACHINES DISCUSSED

New York enlists new members; plans years objectives.

By A. M. Merrill

The New York Section held its last regular dinner meeting of the season on June 20, with some 60 members and guests attending. The meeting was held at the Gotham Hotel, where the accomodations, dinner, and service were excellent and met with the approval of the membership. The Gotham will become the regular meeting place for the group, commencing with the September session.

Speaker of the evening was Frank G. Helander, executive vice president of Watson-Stillman Co., who discussed "Large Injection Machines."

In tracing the growth of injection machine sizes, Mr. Helander first reviewed briefly the sizes of thermoplastic parts that have been injection molded in recent years. With the exception of the classic five-pound battery case halve made by Prolon Plastics, injection moldings during the war period of 1940-1945 were generally limited to a maximum of about 16 ounces, with the great majority being only four to five ounces in weight. Today, injection moldings of 40-50 ounces are almost commonplace, and the industry is beginning to think of molding in terms of pounds rather than ounces.

While large moldings have been made possible by larger machines, many do not realize the rapid strides made by the injection machine manufacturing industry which may yet be in its infancy, but most certainly is out of the cradle. The speaker used Watson-Stillman machines to illustrate the growth in machine sizes, using charts showing shooting capacities and die space areas.

The growth in machine shooting capacities started very slowly in 1937, and gradually reached a 12-ounce size in 1940. In the war period the only change was to 16 ounces, but in 1945 and 1946 capacities surged upward to 22, 24, and 28 ounces. In 1948 the 28-ounce machine was superseded by the 32-ounce unit. In this year the first really large injection machine was introduced; the 40-ounce unit with 30 x 56-inch platens and 1,000-ton clamp. This 40-ounce machine was made especially for refrigerator work, and had a relatively small daylight opening because of the large, shallow parts molded. In 1949 the first 48-ounce machine was produced for general purpose use, and this unit has become the work-horse of the appliance industry.

The banner year for large machines was 1950, when 60-, 85-, 120-, 200-, and 300-ounce machines were made and shipped by Watson-Stillman. These latter three machines are equipped with preplasticizing units, and have opened new horizons for possibilities of good applications with large thermoplastic moldings. The probabilities are that there will be a great many large parts made in the immediate future, particularly in view of the following approximate list of large injection machines currently in actual operation in the United States; 60 ounces, 33 machines; 80-120 ounces, 10 machines; 200 ounces, 7 machines; and 300 ounces, 2 machines. Many additions to this list will be made in the course of this year.

In conclusion, Mr. Helander discussed what can be expected in the next machines to be designed in sizes larger than the current 300-ounce unit. Indicated future requirements point to a machine having a larger platen area, possibly 5 by 8 feet, a 3,000-ton clamp, and a shooting capacity of perhaps 900-1,000 ounces. The utilization of such machines will present a challenge to product designers, molders, application engineers, and the entire thermoplastics molding industry.

Section president George Baron, Ideal Plastics Corp., presided over the meeting, and the speaker was introduced by program chairman Harold Schwartz, Empire Brushes, Inc., Table favors were distributed through the courtesy of Nicholas V. Fasano, Washington Molding Corp., and the meeting concluded with a drawing for door prizes donated by Saul Blitz, Noma Electric Corp., and Sam Silberkraus, Riverdale Laboratories.

Continuing the Section's growth under the able direction of membership chairman Russell H. Skidmore, Celanese Corp. of America, the following three new members have been added to the roster during June: David R. Dunay, Rogers Corp.; Franklin M. Gottheimer, Omni Products Corp.; and Alfred W. Sutter, A. W. Sutter & Co. Expansion in the more distant future was also assured by three new arrivals during the past month: Patricia Sue, born to Mr. and Mrs. Nick Fasano; Jon Stephen, whose proud parents are Mr. and Mrs. Arthur L. Gewertz (manufacturers representative); and Bruce Ernest, a future toolmaker born to Mr. and Mrs. Bruno E. Wessinger (Wess Plastic Molds, Inc.)

Following the custom of previous years, the Section began the new fall season with a dinner meeting on September 19 at the Gotham Hotel. In addition to being the annual business meeting, this was also the annual "gripe session" where complaints and suggestions from the members were discussed and plans laid for the ensuing year.

CHICAGO HOLDS OPEN PANEL

By Tim Serrell

At the special June SPE-SPI meeting held Wednesday evening, June 13, 1951, the following four topics were discussed in an open panel:

1. Mold Temperature Control by William Gobielle of Nash-Kelvinator Corporation.
2. Cleaning of Injection or Extrusion Panels by Bill Wright of Service Plastics, Incorporated.
3. Hopper Loaders by Robert Peltz of Victory Manufacturing Company, Chicago.
4. High Frequency Heating.

Captain William J. Gary, United States Army Air Force, explained in detail steps that are being taken to provide for the air defense of the United States and Canada with special emphasis on the Chicagoland problems. Needed volunteers for this vital program were asked to report to the State Civil Defense Office.

June 15, 1951, a golf outing of the Plastics Engineers and SPI, was held at the River Forest Country Club, Elmhurst, Illinois.

July 24, 1951 marked the second golf day to be held at Rolling Green Country Club, Arlington Heights, Illinois.

August 17, 1951 again saw the golf outing at River Forest Country Club, Elmhurst, Illinois.

Remember the fall meetings are scheduled for the second Wednesday evening of each month commencing with the first one on September 12, 6:00 P.M., at the Builders' Club, 228 North LaSalle Street, Chicago.

Kindly send names of prospective members to Mr. B. D. Ashbaugh c/o Hydraulic Press Mfg. Company, 201 North Wells Street, Chicago 6, Illinois. If in doubt about whether an associate is a member check with Mr. Ashbaugh or check the June issue of the SPE Journal.

8th SPE TECHNICAL CONFERENCE
CHICAGO
Jan. 16-18, 1952

MIAMI VALLEY ENJOYS SUMMER AND FALL OUTINGS

By John L. Russell

Forty members and 7 guests were in attendance at the 5th Annual Summer Picnic of Miami Valley Section, SPE held at Terrace Park Country Club, Milford, O. on Friday, June 29, 1951.

Jack Baxter, Terrace Park Club member again was Chairman of the Picnic Committee. Merle Nelson and Robert Gerdes of the Plastics Moldings Corp. secured the prizes and John Brierley, Bakelite Corp., handled the special gifts committee. A golf tournament, softball and a horseshoe tournament featured the afternoon and evening outing.

Prize winners in golf were: Low gross, Jack Baxter with a score of 85; winners of low net with a score of 74 were Bud Bain, Frank Strobino, General Electric; and Paul MacPhee, National Cash Register Co. Each winner received three new golf balls. A handsome pocket knife went to Carl Weber and Carl Ackerman, the 2-man team from Crosley Div., Avco Corp., winners in the horseshoe tournament. Door Prize winners were as follows: 1st prize, a table model radio to Charles Selz, Kurz-Kasch Inc.; 2nd prize, a Badminton set, to Al Pfau, Plastic Moldings Corp.; 3rd prize, a coffee-maker to John Fiedler, F & F Mold & Die Works; 4th prize, a popcorn popper to Dick Bice, Formica Insulation Co.; 5th prize, a picnic set to Joe Fiedler, F & F Mold & Die Works; 6th prize, beach bag, to William Gerdes, Plastic Moldings Corp.; 7th prize, a flashlight to Harold LaCasse, Pennsylvania Salt Co.

A very excellent buffet supper was served with plenty to eat. Everyone present commented favorably on the fine facilities provided by the Club.

Following dinner, Martin Kasch, President, showed several Castle films of Sports Thrills, Water Sports, Camera Thrills in Darkest Africa and Music with Spice.

Recent new members added to the roster of Miami Valley Section include Robert Beaver, Plastic Research Products Co., Urbana, O.; Ralph Blair, National Cash Register Co.; Paul Best, Crosley Div., Avco Corp.; John Kilfoil, Sales Representative, Erie Resistor Co.; Fred Wiley, Grote Mfg. Co., Bellevue, Ky.; Henry Kazimier, Continental Can Co.; George Storar and Harold Spires, Kurz-Kasch, Inc.; John White, Buckeye Molding Co.; Paul Caldwell, Plastic Research Products Co.; Jacques Barnhiser, National Cash Register Co.; Harry Hill and Alfred Jareki, Cincinnati Advertising Co.; and Hubert Frankenfeld, Sales Representative, Durez Plastics & Chemicals, Inc.

This wound up the year's activities for Miami Valley Section. The new fall and winter season was ushered in September 6 with the usual Old River Park Picnic in Dayton. Chester Kruger and Byron Nelson made all of the arrangements.

CLEVELAND HOLDS PANEL ON MOLDING TOPICS

By A. R. Morse

The first fall meeting of the Cleveland Section of SPE was held at Kiefer's Tavern on September 10th. Wayne Anderson moderated a panel discussion covering injection molding and extrusion. Topics on the agenda included preplasticizing, future of big injection machines, and dry coloring for the injection molder. The topic of dry coloring lead into a discussion of hot blending equipment by both the hot mill and extrusion methods, as well as other phases of extrusion, including the questions raised about the high cost of extrusion machines.

The Cleveland panel consisted of Dave Sloan, Vice-President of Lester Engineering Co.; A. R. ("Ren") Morse, President of Injection Molders Supply Co.; George Field, Technical Service Representative of B. F. Goodrich Chemical Co.; and Hans Beucken, Manager of Extrusion Division, National Rubber Machinery Co.

EAST NEW ENGLAND BEGINS PLANS FOR 1953 CONFERENCE

By Robert C. Davenport

Shortly after Labor Day, the Eastern New England Section will open its season with a dinner dance at the Smith House in Cambridge. Wives and friends of the members will be their honored guests Thursday, September 27, for the first meeting in the fall. The Smith House is situated on beautiful Memorial Drive overlooking the Yacht Basin and the Boston Sky-Line.

The brief business meeting will be focused on the 1953 national convention of the SPE, which will be held in Boston. The Statler Hotel has already been secured for Wednesday, Thursday, and Friday, January 21, 22, and 23. As well as having a wide variety of industry located in the environs, Boston is a seat of culture, education, and historical lore. Plans will get under way to make this an outstanding and worth-while convention.

The last meeting this spring was that in April held jointly with the Boston-Providence Chapter of the S. P. I. This and previous joint meetings have proved most interesting, and the membership will be asked their views on such activities for the coming year.

Personal Notes! Frank Rideout of Bakelite was at Boston University this spring taking a course in market research. At last reports he was completing a thesis on The Market Possibilities of Vinyl Sponge. Bill Root has recently transferred from the Macallen Company to the Raytheon Corporation, where he is working as Insulating Engineer. George S. Laaff of the Bolta Company recently returned from Germany and France, where he was investigating new sources of business for his company. Glove Specialties, a new concern in this area, is currently manufacturing plastic work gloves.

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HOBBING CAVITIES IN ALLOY STEELS

By JOHN L. SEKOWSKI

Midland Engraving Co., Chicago, Illinois

The hobbing process is clearly and interestingly discussed in this paper which won the local Chicago prize in the 1950 SPE Prize Paper Contest.

A very important segment of the plastic industry is that part concerned with the molding of plastics. In the molding process, molds are used to form the raw material into the finished product. The component parts of the mold that form the plastic parts are called cavities. In the past, most cavities had to be machined at great expense of time and money. Throughout the industry there was a general demand for a cheaper and faster method. I will attempt to show why more and more plastic molders are realizing that alloy hobbed cavities are the answer.

What is hobbing? When we refer to hobbing, we mean the pressing of a hardened steel master hob into an annealed steel blank. The master hob is an exact duplicate of the part to be produced in the die or mold. The steel blank which the hob is pressed into is called the hobbed cavity.

500 tons was big

About fifteen to twenty years ago when hobbing was in its infancy, a press of 500 tons capacity was considered large and the size of hobbed cavities in those days was limited to approximately 8 square inches. The steel used in hobbed cavities was a plain Swedish iron of the carbon .05, manganese .15 type. This hobbing steel when carburized had no core hardness to speak of; therefore, there were many cavity failures in the compression molding field.

The hobbing industry has come a long way in the last fifteen to twenty years. It has had to move fast to keep up with the pace set by the fast-moving plastic industry. As we all know, years ago the plastic industry was limited to very small parts such as radio knobs and small electrical parts. As molded parts became larger and larger, naturally the capacity of hobbing presses had to be increased also. Today, 3000 ton presses are common all through the hobbing industry and there is one press in the plastics industry that has a capacity of 8000 tons.

Ring needed

In the hobbing of steel hobbed cavities, a retainer ring is necessary to confine the metal as the hob is pushed into the blank. These retainer rings are made of heat treated tool steel and are designed to withstand great pressures. With the coming of the larger presses and increased capacities, it became necessary to design larger and stronger rings to hold the blanks. Retainer rings are made in various sizes and shapes; round blanks require rings in ½" sizes up to 6"—over 6" blank sizes increase by the inch up to 10". Blanks measuring 10" to 22" are special and must be made to order. For rectangular blanks a large rectangular ring and spacers are used to confine the various size blanks.

Explosions

The openings in the retainer rings are made with an angle on all sides to facilitate the easy ejection of the blank after the hobbing operation is completed. The taper on the side walls is also used for the closing of hobbed cavities. Although these rings are made with very heavy walls and are as strong as it is possible to make them, on occasions they will break in hobbing. When this happens one would think a bomb had exploded. For this reason all hobbing presses should be well protected with armor plate, because one of these particles flying from a broken hob or a broken ring could seriously injure the operator. The usual procedure is to have a safety glass peek-hole in the armor plate doors. This helps the operator do a better job because he can see the progress being made by the hob as it sinks into the hobbed cavity. I know of a case where a hardened alloy steel ring broke through a cross section 28" x 8". This happened with only 4800 tons of pressure on the hob.

Chisel steel needed

Years ago, when plain Swedish iron was used exclusively for hobbed cavities, tool steels known as the chrome manganese tungsten type (carbon .09, chromium .5, manganese 1.15, tungsten .5) were used for hobs. Here again hob steels presented a problem similar to the one I just discussed on the rings, because the capacities of hobbing presses have been increased and tougher alloy steels are now used in hobbing. This forced the hobbing industry to develop tougher steels for hobs. Hob steels of today must be able to withstand as high as 150 tons per square inch of pressure. The steel most commonly used in hobs today is known as a chrome silicon manganese type with 2.5 tungsten. This is a chisel type of steel and has proved very satisfactory. For large hobs that require greater pressures, the high speed type of steel is usually used.

In the construction of hobs the tool maker must be sure he has the proper drafts on all hobbing surfaces. Above all, he must be careful to avoid thin sections, unbalanced sections, and sharp corners on hobs to be used in the hobbing of alloy steel. If at all possible, corners on hobs should have at least a .010 radius. Draft on the side walls of hobs are quite necessary because if this draft is not present, the hob will have a tendency to tear as it is going down into the blank. Another reason for the draft on the side walls of a hob is that it can be fitted into the cavity after annealing for subsequent pushes. Many hobs have been broken in the process of pulling them out of the cavities. This is usually due to undercuts or backdraft on the side walls of the hobs; therefore, the tool maker should be very careful to avoid these errors in the making of hobs. Thin sections on hobs should be avoided at all times.

Engrave slots

It is usually more economical to machine or engrave thin slots in cavities than to try to hob them. This may result in a broken hob and getting into a lot of trouble one way or the other. Unbalanced sections on hobs, such as an angle on one side and a straight wall on the opposite side, will give a hobber headaches as the hob goes down into the cavity blank. Angles will force the hob over to one side and if there are any projections or indentations of any kind on the face of the hob (for instance, lines or letters), they will be torn in the hobbing process. Sometimes an unbalanced condition can be remedied by building a double cavity hob. In this way a balanced condition instead of an unbalanced one will prevail.

While we are on the subject of hob making, it would be wise to discuss the importance of proper heat treating. Regardless of how careful a toolmaker is in the making of the hob, unless it has the proper hardening and drawing, the hob will be useless.

Welded hobs

Because of the toughness of alloy hobbing steel, the hobber experiences more hob breakage. Replacing hobs has become an expensive item in the cost of hobbing. Like other toolers, the hobber has turned to the welder's friend, the welder. Welding hobs has proved quite satisfactory. Sections that occasionally break off are welded on, saving the time and expense of making a new hob.

In the hobbing of alloy steel, all the pitfalls that have been mentioned must be especially avoided because the tougher the hobbing steel the tougher time a hobber has in making a good cavity. The alloy steel most commonly used in the plastic industry today has the following analysis:—carbon .08, chrome 1.4, nickel .5, molybdenum .25. This type of steel has been proved very successful in all types of plastic molding; injection, compression, and transfer. When carburized it gets a surface hardness of 60 rockwell C and it takes a very high polish. In a three inch cavity cross section you will have about a ten to twenty rockwell C reading in the core. This is far superior to the zero reading of the old Swedish iron type of hobbing steel. In making test hobbings, the differences in depths with similar tons of pressure have been checked, using the same hob size blanks on both types of steel.

Annealing necessary

With the old type Swedish iron a depth of one and a half inches was attained, while in this new alloy hobbing steel, the same hob penetrated only three quarters of an inch. Hobbing in the alloy types of steel requires annealing more times than were used in the hobbing of plain iron, but there are very few jobs that are impossible to hob in an alloy steel when the proper annealing procedures are used. There was a time when most molders would frown on the use of hobbed cavities for molding high impact or semi impact materials. Of course, this is all by the board today, because with these alloy hobbing steels there have been many long runs made with high impact materials. The injection molders have also had some cavity failures with the plain hobbing steel. However, with the use of alloy hobbing steels in the injection field, one hardly hears of cavity failures today.

Air Harden

The latest addition to the hobbing steel family is an alloy steel of the air hardening type. This steel contains carbon .10, chrome 5, silicon .20, molybdenum .90, manganese .30, vanadium .35. One can see from this analysis it is a pretty tough steel. As a comparison between the hobbability of this air hardening steel and the alloy hobbing steel referred to previously, the air hardening steel cavity after being subjected to the same pressure attained a depth of only $\frac{1}{4}$ $\frac{3}{8}$s of an inch. This clearly demonstrates that the hobber will be forced to anneal the air hardening steel cavity three times to achieve the same result that can be attained in one annealing process using the alloy hobbing steel. This type of steel has worked out very satisfactorily for long running plastic jobs and also for zinc die casting dies, inasmuch as it has a lot of resistance to heat, holding its physical properties at operating temperatures of 800 F. If this air hardening steel is pack hardened, it will give a surface hardness of 60-64 rockwell C and a core hardness of 35 to 38 rockwell C. Cavities made of this steel compare favorably with tool steel cavities.

Cost is a factor

Undoubtedly, the item which we are all most interested in, is cost. The mold maker always wants to know the cost per cavity and also what the increase in the cost of hobbed cavities will be with the use of alloy steel. The molder, however, is interested in the cavity cost per unit or molded part. In answer to the mold makers question, alloy steels have increased the cost of hobbed cavities. However, when you consider the toolmakers wages today, the cost of machining multiple cavity molds is prohibitive. When a cavity lends itself to hobbing, it is still the most economical way to make it; whether it will be made in regular hobbing steel for shorter runs or alloy hobbing steels for longer runs or high impact materials.

Inside Stuff

(Continued from page 7)

Ten years old this January! SPE was chartered as a non-profit organization Jan. 6, 1942, and will celebrate its first decade with the Eighth Conference, and in very good health. Excellent omens include the fact that over half the membership had paid dues in less than two months from the first billing date—a happy circumstance unparallelled in previous history and not achieved by many organizations. With luck the last sheep will be in the fold before long.

Another sign of growing health is the fact that new membership applications kept coming in all **summer.**

Quietly working not very far behind the scenes is a special committee, headed up by Ed Rowan in the New York area, Marion Arthur in Texas, who have been tackling some tough problems that have vexed your editor for years. Number one is trying to find out what you want in the magazine. What kind of articles, features, and so on. Do you like industry notes? Personals? Section news? Got ideas for other features?

It occurs to your editor that if we just plain asked the readers for their ideas, we'd get them. So, we're asking.

Lots of people wander into the SPE office and want to know about whether 'plastic' is good for something or other. Get letters, too, like this one:

"Dear Sir, I am twelve years old. I am supposed to give a report to my English class. I want to talk about plastics.

Please tell me.

Sincerely yours—".

What's New

(Continued from page 2)

SUPPLIES & EQUIPMENT

NEW LAMP

The Lindly Co., 80 Herricks Rd., Mineola, N.Y., has developed a new adjustable industrial lamp, featuring an unusual type of two-lens condensing system and reflector that projects an intense uniform beam of light for all close work operations. The Bright Beam Lamp produces brilliant, shadow free illumination for objects being examined with stereoscopic and toolmakers microscopes, magnifiers and loupes. Inspection of surfaces, finishes, threads, profiles, layouts, profile milling and grinding, engraving, assembly of small parts, etc., are all made easier by use of the lamp.

BENTONITE

White Italian bentonite, used as an emulsifying, spreading, suspending, thickening, plasticizing, absorbing, dehydrating and sizing agent, is again being imported by Whittaker, Clark & Daniels, Inc., 260 West Broadway, New York 13, N.Y.

SANDER & GRINDER

Announcement is made of a new Kindt-Collins Master Spindle Sander and Grinder for wood, metal and plastics, incorporating several new and exclusive features such as: a tilting spindle rather than a tilting table, which can be tilted from 0° to 45° by a worm and gear unit, and can be securely locked into place; the core box attachment, which produces straight and tapers coreboxes mechanically; a lighted periscope for easy reading of extremely accurate settings; a 2 H.P. constant H.P. motor; adaptability of abrasive sleeves from $\frac{1}{4}$" to 4" in diameter and 6" to 11" in length. Full details can be secured from Kindt-Collins Co., 12653 Elmwood Ave., Cleveland, Ohio.

LEVEL CONTROL

A new Tektor level switch makes possible level control of practically all liquids and solids. Liquids may be of high or low viscosity and may have electrical conducting or insulating properties. An electrode, connected to the instrument through a two-foot length of cable, consists of a simple probe, 4" to 6" long, $\frac{1}{4}$" to $\frac{3}{8}$" in diameter, which is inserted into the container at the level at which control is required. A level differential of 1/32" up to $\frac{3}{8}$" may be obtained. Fielden Instrument Corp., 2920 N. Fourth St., Philadelphia 33, Pa., will furnish complete information upon request.

DRYING UNIT

The Patterson Foundry & Machine Company of East Liverpool, Ohio has recently placed on the market a packaged drying unit for the drying of chemical products, raw materials, synthetic compounds, food products, and for use in many processes where the drying of expensive or delicate products is necessary. The unit consists of a rotary dryer with drive, screw feeder, air heater, fan and dust collector integrally mounted on a steel frame.

WHEEL BOND

A remarkable new grinding wheel bond, "XL", designed especially for tungsten carbide tool sharpening, has just been developed. According to a company spokesman, "XL" wheels are "The closest we know to a diamond wheel." Information, literature and samples may be obtained by writing direct to Chicago Wheel & Mfg., Co., 1101 W. Monroe St., Chicago 7, Ill.

JOURNAL

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PLASTICS HORIZONS IS THEME OF SPE 8th TECHNICAL MEET.

"PLASTICS HORIZONS" is the theme for the Eighth Annual National Technical Conference of the Society of Plastics Engineers, Inc., to be held in Chicago on January 16-18, 1952 at the Edgewater Beach Hotel. The Conference will be sponsored by the Chicago Section of the SPE.

The technical papers presented at the Conference will examine the vital role of plastics in our present economy and in the National Defense Program, and the speakers will be men who really know and understand the problems of the plastics industry.

The Conference Committee charged with handling arrangements for the meeting is headed by John T. Bent of Tennessee Eastman, who will act as General Chairman of the Executive Committee, with Robert K. Gossett of Gossett & Hill as Co-Chairman.

The following sub-committee chairmen have been selected:

SPEAKERS — Thomas Cleavener, Koppers Co., Inc.

SECRETARY — M. A. Self, Bee Chemical Company.

PRINTING — R. J. Linehan, Continental Plastics.

PROGRAM — Stanley Peters, Monsanto Chemical Co.

FINANCE & BUDGET — Charles Schiff, Breyer Molding Co.

HOUSE & BANQUET — Clarence McCormick, Superior Plastics Div.

HOTEL (Registration, Reservation & Information) — Maurice Meltzer, Service Plastics, Inc.

SERGEANT AT ARMS — E. E. Eckenbeck, Jr., Midwest Plastic Products.

PUBLICITY — Ned H. Porte, General American Transportation Corp.

RECEPTION — R. J. Linehan, Continental Plastics.

COMPANY REGISTRATION & FAVORS — Robert S. Stephens, Sobenite, Inc.

PRIZE PAPER — John W. French, Ger-Ell Manufacturing Co.

LADIES ENTERTAINMENT — Stanley F. Peters, Monsanto Chemical Co.

A VERSATILE VISE FOR PLASTIC WORK

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THE WILL-BURT COMPANY

Dept. JR **Orrville, Ohio**

What's New

(Continued from page 19)

DRY STEAM

Vapor Heating Corp., 4501 W. 16th St., Chicago, Ill. announces that their Vapor-Clarkson steam generator Model 4740 developed to supply large quantities of hi-pressure dry steam to heat diesel powered passenger trains is now ready for industry to supply processing steam, operate pile driving rigs, heating, 600 pound pressure steam, etc.

COMPANY NEWS

DUREZ

Company spokesmen have announced that Durez Plastics & Chemicals, Inc., North Tonawanda, N.Y., will begin construction on a new $6,371,333.00 phenol plant soon. Approved recently by Defense Production Administration, the plant will double the output of phenol for Durez.

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FIBERITE

The Fiberite Corp., Winona, Minn., recently underwent its second major expansion for the year 1951. The wide-spread acceptance of their high impact molding compound justified and necessitated the increase in their plant capacity.

JUEL-CALRESIN

Announcement was made this week of the formation of the Santa Anita Companies, Inc., for the purpose of merging two Southern California plastic firms: Juel Corporation, with casting and laminating plants in Arcadia, California, producers of laminates, plastic lenses, lens blanks, potting (embedment of electronic and mechanical parts); and the Calresin Corporation, with base resin and coating plants in Culver City, California, which will be producing certain industrial coatings and elastomeric hot melt materials in the Arcadia plant.

Kenneth C. Kingsley, former Vice-President of Norris Stamping and Manufacturing Company and Director of the Thermador Corporation, will be President of the new corporation in addition to retaining his position as President of Juel Corporation.

Mr. William Lockwood, President of Calresin Corporation, will become Vice-President in Charge of Research of the new corporation. Other Officers and Directors will include Wallace Nash, Secretary-Treasurer; Jack Nims, Vice-President in Charge of Sales; and Carl M. Heintz, Sr., well-known Los Angeles businessman, will be Chairman of the Board.

GENERAL

The General Tire and Rubber Company's plastic plant at Jeannette, Pa., is now undergoing an extensive program to expedite full-scale production. "Luxon" is the trade name chosen to cover all of the company's vinyl-type plastics products.

STRONGHOLD

Stronghold Screw Products, Inc., 216-222 W. Hubbard St., Chicago, Ill., announced that its western affiliate, Stronghold Pacific Corp., has acquired the stock ownership of Riveo Inc., Downey, Calif. To augment further Stronghold production, the company has acquired a new factory site on Chicago's northwest side.

THERMOLD

Thermold Corporation, injection molders of plastic parts, announced that they are now operating in their own new fireproof building at Manlius, New York. Located on 6.5 acres in a choice Syracuse industrial area, this Corporation offers a specialized service of molding, finishing and assembly, drop-shipping and mailing.

NUTMEG CHROME

The Nutmeg Chrome Corp., announced the removal of its office and factory to its new building at 111 Vanderbilt Ave., West Hartford, Conn. on August 20.

WABASH METAL

The Wabash Metal Products Company of Wabash, Indiana, announced the acquisition of the exclusive manufacturing, advertising, distribution and sales rights of the Wabash Hydraulic Presses formerly manufactured by Laboratory Specialties, Inc., Wabash, Ind.

U. S. RUBBER

Naugatuck Chemical Division, United States Rubber Co. have a major expansion program aimed at doubling the production of its Baton Rouge, La., Paracril synthetic rubber plant.